CLAIMS

1. A fuel cell system comprising:

a fuel cell stack having a plurality of fuel cells connected in series;

a fuel supply device that supplies fuel to each of the fuel cells based on a fuel supply amount which is a target value;

an air supply device that supplies air to each of the fuel cells based on an air supply amount which is a target value; and

a controller that determines the fuel supply amount and the air supply amount based on a power which is required by a load device and a voltage of each of the fuel cells; wherein

the controller sets at least one of the fuel supply amount and the air supply amount for each of the fuel cells based on the voltage of each of the fuel cells so that a voltage variation of each of the fuel cells is minimized, and

the fuel supply device supplies fuel to each of the fuel cells based on the fuel supply amount of each of the fuel cells, and/or the air supply device supplies air to each of the fuel cells based on the air supply amount of each of the fuel cells.

2. The fuel cell system according to claim 1, wherein

the controller calculates a voltage deviation which is a difference between a voltage of each of the fuel cells and an average value of the voltages of the plurality of fuel cells every predetermined time,

increases or decreases the fuel supply amount of each of the fuel cells according to the voltage deviation while keeping a total fuel supply amount unchanged,

and/or increases or decreases the air supply amount of each of the fuel cells according to the voltage deviation while keeping a total air supply amount unchanged.

3. The fuel cell system according to claim 2, further comprising a temperature measuring device that measures a temperature of the fuel cell stack, and

the controller has a total fuel supply amount table for calculating the total fuel supply amount and/or a total air supply amount table for calculating the total air supply amount based on the temperature of the fuel cell stack and the required power of the load device, wherein

the controller receives the temperature of the fuel cell stack from the temperature measuring device and the required power from the load device, and calculates the total fuel supply amount and/or the total air supply amount based on the total fuel supply amount table and/or the

total air supply amount table, and sets an amount which is obtained by dividing the total fuel supply amount and/or the total air supply amount by the total number of the fuel cells to an initial value of the fuel supply amount and/or the air supply amount of each of the fuel cells, and

the controller repeats every predetermined time calculating the voltage deviation which is the difference between the voltage of each of the fuel cells and the average value of the voltages of the fuel cells, and obtaining the target fuel supply amount and/or the target air supply amount by subtracting a value obtained by multiplying the voltage deviation by a predetermined value, from the fuel supply amount and/or the air supply amount of each of the fuel cells.

4. The fuel cell system according to claim 1, wherein

the controller calculates a voltage deviation which is a difference between a voltage of each of the fuel cells and an average value of the voltages of the plurality of fuel cells every predetermined time, and

when a maximum value of absolute values of the voltage deviations of the plurality of fuel cells becomes smaller than a predetermined value, the controller calculates a generated power of the fuel cell stack within a predetermined time, and increases or decreases a total fuel

supply amount or a total air supply amount according to a power difference between the generated power and the required power from the load device.

5. The fuel cell system according to claim 4, wherein the total fuel supply amount or the total air supply amount is increased or decreased by adding a value obtained by multiplying the power difference between the generated power of the fuel cell stack and the required power of the load device by a predetermined value, to the total fuel supply amount or the total air supply amount.

6. The fuel cell system according to claim 1, further comprising a power converter that controls so that a voltage or current of the fuel cell stack is equivalent to a target voltage or target current determined by the controller, and supplies a power outputted from the fuel cell stack to the load device, wherein

when a minimum voltage value of the voltages of the plurality of fuel cells is smaller than a predetermined voltage value, the controller increases the target voltage to cause the power converter to increase the voltage of the fuel cell stack, or the controller decreases the target current to cause the power converter to decrease the current of the fuel cell stack.

7. The fuel cell system according to claim 6, wherein when the minimum value of the voltages of the plurality of fuel cells is smaller than the predetermined voltage value,

the controller adds a value obtained by multiplying a voltage difference between the minimum voltage value and the predetermined voltage value by a predetermined value, to the target voltage and the power converter increases the voltage of the fuel cell stack based on the target voltage, or

the controller subtracts a value obtained by multiplying the voltage difference between the minimum voltage value and the predetermined voltage value by a predetermined value from the target current and the power converter decreases the current of the fuel cell stack based on the target current.